SUBJECT INDEX

A

Abscisic acid
  leaf wounding and, 252–53
Acer platanoides
  fungal mycelial biomass on, 337
Acetyl-CoA-carboxylase
  inhibitor of, 351
Activation tagging, 52
Adelges piceae, 154
Aegilops ventricosa
  wheat rust resistance and, 322
Aerobiology, 1–2
Aflatoxins
  food crops affected by, 350
Agricultural Research Service (ARS)
  integrated pest management research and, 383
Agrobacterium, 45–61
  T-DNA transfer to plant cells, 46–47
  Ti plasmid of, 47
Agrobacterium-based plant gene tagging vectors, 49–50
Agrobacterium-based transformation vectors, 47–49
Agrobacterium rhizogenes
  phytohormone biosynthesis and, 52
  Ri plasmidsof, 48
Agrobacterium tumefaciens
  geminivirus replication in, 202
  phytohormone biosynthesis and, 52
Agroecosystems
  Fusarium oxysporum in, 112
Agropyron elongatum, 313
  translocation derivatives of wheat rust resistance and, 322
Agropyron scabrum
  wheat stem rust survival on, 319
Ainsworth, G. C., 10
Alfalfa
  proteinase inhibitors in induction of, 252
  systemic acquired resistance in, 238
Allergens
  fungi as, 8–9
Alternaria alternata
  colonization of leaves by, 338
  systemic acquired resistance and, 242
Alternaria solani
  fungicides for, 354
DL-3-Aminobutyric acid
  systemic acquired resistance and, 258
Aminocyclopropane-1-carboxylase synthase
  ethylene biosynthesis and, 55
Ammonium sulfamate
  eradication of *Ribes* and, 101
Ampelomyces quisqualis, 364
Ampicillin
  resistance to, 48
Andersen sampler, 10
Anderson, P., 271–89
Andoprim, 354
  structure of, 354
Anginine decarboxylase
  putrescine production and, 58
Angiotensin-I-converting enzyme inhibitor (ACEI), 70
Anilinopyrimidines, 354–55
Anthony, V. M., 349–66
Anthracnose, 236
Antibiotics
  white pine blister rust and, 103–4
Anticipatory resistance breeding, 311–24
  strategy of, 321–23
Antisense expression, 59–60
Aphids
  transmission of barley yellow dwarf virus and, 179–82
Apple leaves
  yeast densities on, 337
Apple scab, 31, 376
  fungicides for, 353–55
Appressorium formation, 211–28
  endogenous signaling pathways and, 220–25
  environmental cues signaling, 215–18
Appressorium function, 225–27
Arabidopsis
  senescence-specific promoter from, 56
  systemic acquired resistance in, 238, 242–43
  T-DNA tagging in, 51–52
Arabidopsis thaliana
  systemic acquired resistance in, 242
  transformation and, 50–51
Arachidonic acid
  systemic acquired resistance and, 256–57
Ascospores, 11
Asparagus bean
  systemic acquired resistance in, 238
Aspergillus fumigatus, 10
Atmosphere
  phyllosphere populations and, 328–29
Aureobasidium pullulans
  colonization of leaves by, 338
  populations on *Acer platanaoides* leaves, 337
Australia
  anticipatory resistance breeding in, 311–24
  variability of wheat rust pathogens in, 320–21
Auxin
  biosynthesis of, 46, 53–54
Avocado fruit wax
  appressorium formation and, 216
avr genes, 131
Ayliffe, M., 271–89
Azoxystrobin, 352
  structure of, 353

B

Bacon, A., 2, 3
Bacteria
  phytopathogenic
    hrp genes of, 130
    hypersensitive reaction and, 129–30
  populations on leaves, 330
Bacterial polysaccharides
  plant infection processes and, 139
Bacteria-plant interactions
  hrp genes and, 129–46
Bailey, L. H., 41
Bain, S. M., 24
Balsam woolly adelgid, 154
Bamboo mosaic potexvirus
  satellite RNA of, 201
Banana
  Fusarium wilt of, 117, 119

Banana bunchy top virus
divided genome of, 196
Banting Research Foundation, 4
Barley
mlo powdery mildew resistance gene of, 307–8
resistance to barley yellow dwarf virus in, 184
systemic acquired resistance in, 238
Barley grass
wheat leaf rust and, 319
Barley yellow dwarf virus (BYDV), 167–85
aphid transmission of, 179–82
disease control and, 183–84
economic importance of, 170
gene expression in, 174–79
interactions with plants, 170–72
movement protein of, 173–74
natural tolerance to, 183–84
replication proteins of, 172–73
satellite RNA of, 182–83
serotypes of, 168
structural proteins of, 173
subgroups of, 168–70
transgenic resistance to, 184
Basidiospores, 11
Bawden, F. C., 2, 8
Bayoud disease
cause of, 119
Bean
leaves of
microbial populations on, 334, 336
phytolexin production in suppression of, 144
systemic acquired resistance in, 238
induction of, 256
Beauchamp, C., 2
Beaumont, A., 2, 4
Beech bark disease, 153
Beet western yellows luteovirus (BWYV), 168
Begonia leaf blight, 31, 32
Benzo-(1,2,3-)thiadizole-7-carbothioic acid S-methyl ester
systemic acquired resistance and, 258–59
Bessey, C. E., 25, 30, 36
Binary vector technology, 48–49
Biological control agents (BCAs), 364
Bisby, G. R., 2
Black currant
blister rust and, 97–98
Black pod, 11
Black stem rust
of wheat
cause of, 4
Blasticidin S, 351
Blister rust control (BRC), 88
decline of, 105
Blister rust fungus, 94
See also White pine blister rust
Bordeaux Mixture, 350
Botrytis
colonization of leaves by, 338
Botrytis cinerea, 5
fungicides for, 352
Botrytis polyblastis, 4–5
Brackett, G. B., 38
Brady, A. M., 349–66
Brassica campestris leaves
microbial populations on, 336
Brome mosaic virus (BMV)
cloned cDNA copies of infectious transcripts of, 68
Bromoviruses
overlapping in, 197
recombination in, 196
Brown, G. N., 311–24
Brown, W., 2, 3
Buller, A. H. R., 2, 3, 4
Burrill, T. J., 30, 32
Bursaphelenchus xylophilus, 153–63

C

Calcium signaling
appressorium formation and, 221
cAMP
appressorium induction and, 222
Campbell, C. L., 29–41
Campbell Soup Company
integrated pest management and, 389
Capsular polysaccharides
plant infection processes and, 139
Carleton, M. A., 37
Carnation
systemic acquired resistance in, 238
Carpropamid, 356
structure of, 356
Catalase
salicylic acid and, 248–49
Catherostigma plantagineum
mutant callus of, 52
Cauliflower mosaic virus (CaMV)
35S RNA promoter from phytohormone biosynthesis and, 53
Caulimoviruses
mutation rates and, 194
recombination in, 196
Celery blight, 31
Cephalosporium
colonization of leaves by, 338
Cereal rusts
appressorium induction and, 217
genetic plasticity of, 299
CGA 41396, 356
structure of, 357
CGA 245704, 356–57
structure of, 357
Chamberlain, A. C., 6
Chestnut blight, 87, 153, 376
Chitinases
antifungal activity of, 241
Cladosporium, 18
Cladosporium cucumerinum
mycelia of
lignification of, 240
Cladosporium herbarum
colonization of leaves by, 338
Closteroviruses
gene duplication in, 197
Cochliobolus
appressoria of, 226
Colletotrichum
appressorium formation and, 212
Colletotrichum gloeosporiodes
appressorium formation and, 216
Colletotrichum graminicola
attachment to host surface, 213–14
mucilage covering conidia of, 214
Colletotrichum lagenarium
mycelia of
lignification of, 240
systemic acquired resistance and, 142, 236
Colletotrichum lagenarium-cucumber
defense response and, 244
Colletotrichum lindemuthianum
hypersensitive reaction and, 244
Colletotrichum musae
appressorium formation in, 216
Colletotrichum trifolii
appressorium formation in
calcium signaling and, 221
germination and differentiation in
protein kinase C and, 221
Collins, N., 271–89
Colman, N. J., 20, 34
Comoviruses, 72
Concanavalin A
conidial attachment and, 214

Conditioning
systemic acquired resistance and, 243–45
Coniosporium corticale Ellis & Everhart
sycamore disease and, 8–9
Consortium for Integrated Pest Management (CIPM), 377–78
Consumers Union (CU)
integrated pest management and, 386–87
Cooke, M. C., 19
Coprinus
tetrapolarity in, 3
Coville, F. V., 38, 41
Cowpea mosaic virus (CPMV)
capsid peptide presentation and, 72–76
icosahedral asymmetric unit of, 73, 81
Cowpea mosaic virus (CPMV)-based chimeras
electron density for, 80
generation of, 77
production of, 75
Cronartium ribicola
Ribes species susceptible to, 92
white pine blister rust and, 91–94
Crop biotechnology, 364–65
Crop plants
Fusarium oxysporum isolated from, 112
Crown gall, 39
Cryptic viruses, 201
Cryptogein
systemic acquired resistance and, 257
Cryptostroma, 9
Cucumber
systemic acquired resistance in, 238, 242
induction of, 142, 256
Cucumber-*Colletotrichum lagenarium*
defense response and, 244
Cucumoviruses
mutation rates and, 194
overlapping in, 197
recombination in, 196
Culverhouse, M. F., 4
Currants
white pine blister rust and, 91
Cuticle
derivatives of appressorium formation and, 216
Cutinase, 220
Cyclic nucleotides
appressorium induction and, 221–22
Cycloheximide
white pine blister rust and, 103–4
Cyprodinil, 354–55
structure of, 354
Cytokinin
biosynthesis of, 46, 54–55
callus formation and, 52

D

Dabney, C., 22
Damping-off disease, 376
Date palm
Bayoud disease of
cause of, 119
Davidson, A. M., 2, 3
Dean, R. A., 211–28
Dermatophyte infection, 4
Dianthoviruses, 169
2,2-Dichloro-3,3-dimethylcyclopropane carboxylic acid
systemic acquired resistance and, 257
Dicotyledonous plants
systemic acquired resistance and, 236–37
tumor initiation on, 45–46
Didymella exitalis
ascospores of, 11
DNA viruses
recombination in, 195–96
Doncaster, J. P., 5
Downy mildew, 20–21, 34
control of, 350
fungicides for, 353
Drosophila
Bar locus of
patterns of recombination at, 297
dsp genes, 132
Dutch elm disease, 153, 376
Dwinell, L. D., 153–63

E

Ebola virus, 204
Economic Research Service (ERS)
integrated pest management initiatives and, 383–85
Eczema
facial of sheep, 10
Electrical signals
systemic acquired resistance and, 254–55
Elicitins
systemic acquired resistance and, 257
Ellis, J., 271–89
Ellis, J. B., 18, 31
Ellis, M. B., 10
Environmental Protection Agency (EPA), 362
Epicoccum purpurascens
colonization of leaves by, 338
Epoxiconazole, 359
Ergosterol biosynthesis
fungicides, 359
Ergot toxins
food crops affected by, 350
Erwinia amylovora
hrp genes of, 130
hrp systems of, 132, 136
Erwinia amylovora Ea321
harpin isolated from, 137–38
Erwinia carotovora
hrp genes of, 130
Erwinia chrysanthemi
hrp genes of, 130
Erwinia soft-rot bacteria
pel genes of, 143–44
Erysiphe graminis
fungicides for, 355
Escherichia coli
type III secretion system in, 133
Essary, S., 24
Ethylene
biosynthesis of, 55
ripening in climateric fruit and, 216
systemic acquired resistance and, 255–56
European black currant
blister rust and, 97–98
European Plant Protection Organization (EPPO), 155, 159
European woodwasp, 154
Exotic pests, 153
Experiment Station Committee on Policy (ESCOP), 378
Extracellular polysaccharides
plant infection processes and, 139
Eyespot
fungicides for, 355

F

Fairchild, D. G., 35
Famoxadone, 353–54
structure of, 354
Farlow, W. G., 30, 32
Farmer's lung, 9, 10
Fatty acids
systemic acquired resistance and, 256–57

Fenpiclonil, 351–352
structure of, 352
Fenpropidin, 356
Fibronectin
appressorium formation and, 219
Finnegan, J., 271–89
Finnish Plant Quarantine Service, 154
Fitness
plant viruses and, 198–99
Fitt, B. D. L., 1–13
Flax rust pathogen, 286–88
Flax rust resistance gene products
characterization of, 278–79
Flax rust resistance genes, 271–89
cloned
transgenic flax and, 279
evolution of, 284–85
locus structure of, 274–76
molecular analysis of
implications of, 288–89
signal transduction and, 286
specificity control regions of, 279–81
structure and expression of, 276–78
transposon tagging of, 272–74
See also Rust resistance
Fludioxonil, 351
structure of, 352
Food
pesticide residues in, 362
Food and Drug Administration (FDA), 362
Food Quality Protection Act of 1996 (FQPA), 362–63
Food safety
fungicides and, 350
Frankland, A. W., 8
Fritsch, F. E., 3
Frost, D., 271–89
Fungi
as allergens, 8–9
attachment to host surface, 213–15
mechanisms for sensing environmental cues, 218–20
plant parasitism by, 211–28
populations on leaves, 330
rainfall and, 336–37
Fungicides, 349–66
environmental/toxicological considerations and, 361–63
with indirect mode of action, 356–57
integration with disease control technologies, 363–65
natural products, 351–53
resistance to, 359–61
screening for new, 357–59
target site identification and, 359
Fusarium disease, 3
Fusarium oxysporum
ecological activities of, 112–14
evolution of, 111–24
formae speciales, 114–17
pathogenic variants within, 114–17
origin of, 117–23
Fusarium solani pisi
cutinase activity in, 220
Fusarium toxins
food crops affected by, 350

G

Galloway, B. T., 22, 29–41
Geminiviruses
DNA sequences of, 202
mutation rates and, 194–95
recombination in, 196
Gene duplication
plant viruses and, 197
Gibberellin
biosynthesis of
hydroxylase in, 52
Glucanases
antifungal activity of, 241
β-(1,2)-Glucan synthesis
Pseudomona syringae hrpM and, 139–40
Glume botch of wheat
fungicides for, 354
Glycerol
appressorium formation and, 223
Goodale, G. L., 36
Gooseberries
white pine blister rust and, 91
Gordon, T. R., 111–24
Grape black rot fungus, 18, 20–22, 34
Grasslands
Fusarium oxysporum and, 113
Gray mold
fungicides for, 354
Greenland, A. J., 349–66
Gregory, P. H.. 1–13
Guignardia bidwellii, 20
Guthrie, E. J., 9
Gypsy moth, 154

H

Halsted, B. D., 35
Harpins
hypersensitive reaction and, 137–39
Heaney, S. P., 349–66
Henden, D. R., 11
Herbicides
eradication of *Ribes* and, 101
Hilty, J. W., 17–25
Hippophae rhamnoides
microbial colonization of leaves of, 338
Hirst, J. M., 8
Hirst Automatic Volumetric Spore Trap, 8
House dust allergy, 8
Houston, D. F., 40
Howard, L. O., 38
Hrp-avr gene interactions, 140–42
hrp gene products
biochemical functions of, 132–39
type III secretion systems and, 133–34
hrp genes, 129–46
genetic organization of, 131–32
induction of plant defense responses and, 142–43
pathogenicity and, 143–45
regulation of, 132
systemic acquired resistance and, 257
hrp regulatory systems, 135–37
Hulbert, S. H., 293–309
Human immunodeficiency lentivirus, 204
Hydrophobins, 215
Hypersensitive reaction (HR)
in bean hypocotyls, 244
disease resistance and, 129
elicitors of, 137–39
rust resistance and
Rp genes and, 294

I

INA
systemic acquired resistance and, 258
Infection gradients, 5–6
Inorganic compounds
systemic acquired resistance and, 256
Insects
pinewood nematode and, 157
Insertional mutagenesis
knock-out, 51–52
Integrated pest management (IPM), 350, 361, 373–90
Clinton administration and, 380–81
ecologically based, 385–89
evolution of concept, 376–80
fungicides and, 364

USDA initiative strategic plan objectives, 381–85
Integrins
appressorium formation and, 219
International Cocoa Black Pod Research Project, 11
International Committee on the Taxonomy of Viruses (ICTV), 168
Ips grandicollis, 154
Irradiation
pinewood nematode extermination and, 160

J

Jacobsen, B. J., 373–90
Jasmonates
systemic acquired resistance and, 251–52
Johnson, J., 67–84
Johnson, T., 3

K

Kanamycin
resistance to, 48
Kasugamycin, 351
Kinkel, L. L., 327–43
Knapp, S. A., 39
Knight, S. C., 349–66
Koncz, C., 45–61
Kresoxim-methyl, 352–53
structure of, 353

L

Lacey, J., 1–13
Lacey, M. E., 1–13
Lamson-Scribner, F., 17–25, 32–33, 35, 38
Lawrence, G., 271–89
Leaf blights, 35–36
Leaf botch of wheat
fungicides for, 354
Leaf rust resistance
breeding for, 316–17
Leaf senescence
jasmonates and, 251
Leaf spot, 376
Leaves
microbial population dynamics on, 327–43
Light
appressorium formation and, 216
Lignification
systemic acquired resistance and, 237–41
Lin, T., 67–84
Lindgren, P. B., 129–46
Linoleic acid
systemic acquired resistance and, 256–57
Linolenic acid
jasmonates derived from, 251
systemic acquired resistance and, 256–57
Linum
rust resistance in, 285–86
Lipooligosaccharides
plant infection processes and, 139
Lipopolysaccharides
plant infection processes and, 139
Logs
pinewood nematode and, 162
Lomonossoff, G., 67–84
Luck, J., 271–89
Lumber
pinewood nematode and, 161–62
Luteoviruses, 168
aphid transmission of, 179–82
mutation rates and, 194
recombination in, 196
subgroup I, 169
subgroup II, 169–70
translation in, 175–79
Lycoperdon
basidiospores of, 11
Lymantria dispar, 154

M

Magnaporthe grisea
appressorium formation and, 212
attachment to host surface, 214
hydrophobin MPG1 gene in, 215
MAP kinase gene of, 224–25
Maize
genetic diversity of, 296
proteinase inhibitors in induction of, 252
R locus of
patterns of recombination at, 297
rust resistance in, 293–309
genetic control of, 294–96
systemic acquired resistance in induction of, 256
Maloy, O. C., 87–105
Maple bark stripper's disease, 9
Marifiviruses
replication of, 202
Martyn, R. D., 111–24
Mauch-Mani, B., 235–59
Maunsell, K., 2, 8
Maximum residue limits (MRLs), 362
May, K. R., 8
McIntosh, R. A., 311–24
Medical mycology, 2
Melanization
appressorium function and, 225–26
Melon
proteinase inhibitors in induction of, 252
systemic acquired resistance in, 242
Membrane-derived oligosaccharides, 139
Mepanipyrim, 354
structure of, 354
Metam-sodium
pinewood nematode extermination and, 160
Metarhizium anisopliae
appressorium formation in calcium signaling and, 221
Metconazole, 359
Methionine
fungitoxicity of anilinopyrimidines and, 355
Metraux, J. P., 235–59
Microbial populations
dynamics on leaves, 327–43
mechanisms of change, 328–29
patterns in space, 330–36
patterns in time, 336–42
Miller, W. A., 167–85
mol powdery mildew resistance gene, 307–8
Monilinia
fungicides for, 352
Monochamus
pinewood nematode and, 157–58
Monoclonal antibody technology
diagnosis of pathogen infection and, 365
Monocotyledonous plants
systemic acquired resistance and, 236–37
Morton, J. S., 37
Muller's ratchet, 198
Murray, D. C., 349–66
Muskmelon
systemic acquired resistance in, 239
Mutagenesis
insertional
knock-out, 51–52

Mutation
plant virus evolution and, 193–95
Mycotoxicosis, 10
Mycotoxins
food crops affected by, 350

N

Narcissus
foliar diseases of, 4
Fusarium disease of, 3
National Research Initiative Competitive Grants Program (NRICGP, 379
National Wheat Rust Control Program (NWRCP), 313–15
Natural protection, 235
Natural selection
plant viruses and, 198–99
Nectria haematococca
attachment to host surface, 213–14
Nematodes
See Pinewood nematode
Nepoviruses
recombination in, 196
Newton, M., 3
Nicotiana
nuclear genome of geminivirus DNA sequences in, 202
Nicotinamide
systemic acquired resistance and, 257
Nopaline synthase gene, 47
North America
arrival of white pine blister rust in, 95–96
North American pines
blister rust and, 91
Nutting, W., 24

O

Office of Blister Rust Control (OBRC), 96
Office of Technology Assessment (OTA), 378
Oilseed rape
systemic acquired resistance in, 239
Oleic acid
systemic acquired resistance and, 256–57
Ophionectria, 18
Organic compounds
systemic acquired resistance and, 256–57
Ornithine decarboxylase
putrescine production and, 58
Orton, W. A., 39
Oudemansiella mucida
fungicidal natural products in, 352
Oudemansin A, 352
Overprinting
plant viruses and, 197–98
Oxidative damage
DNA mutations and, 194

P

Pantoea stewartii
hrp genes of, 130
Pathogenesis-related proteins
systemic acquired resistance and, 241–43
Pathogenicity
hrp genes and, 143–45
Patulin
food crops affected by, 350
pBR322, 47
pBR322 replicon, 49
Pea early browning tobravirus
reassortment and, 197
Pea enation mosaic virus (PEMV), 170
evolution of, 201–2
Peanut stunt cucumovirus
reassortment and, 197
Pearl millet
systemic acquired resistance in, 239
Pearson, A. W., 21
Penicillin, 7
Penicillium
colonization of leaves by, 338
Penicillium chrysogenum, 7
Pepper
papillae formation in suppression in, 144
Peptide expression
of plant viruses, 67–84
Pepys, J., 9, 10
Peronospora parasitica
systemic acquired resistance and, 236, 243
Peronospora tabacina
systemic acquired resistance and, 242
Persimmon leaf-blight, 31
Pesticides
maximum residue limits for, 362
Peterson, P. D., Jr., 17–25, 29–41
Pethybridge, G. H., 3
Petunia
transformation and, 50
pGV3850, 47
Phenoxy herbicides
eradication of *Ribes* and, 101
Phenoxyquinolines, 355
Phenylalanine ammonia-lyase
lignification and, 237
Phenylpyrroles, 351–52
structures of, 352
Phoma
colonization of leaves by, 338
Phoma uvicola, 21
Phoresy
pinewood nematode and, 157–58
Phosphate salts
systemic acquired resistance and, 256
Phyllosphere microbial populations, 327–43
patterns in space, 330–36
patterns in time, 336–42
Phyllosticta labruscae, 21
Phyllosticta viticola, 21
Phytohormones, 45–61
action of
plant transformation vectors and, 52
biosynthesis of
genes encoding proteins involved in, 52–53
T-DNA transfer and, 46–47
Phytophthora infestans
disease gradients for, 7
fungicides for, 354
infection gradients for, 6
systemic acquired resistance and, 242
Phytophthora infestans-tomato
defense response and, 244
Phytophthora megakarya, 11
Phytophthora megasperma
systemic acquired resistance and, 242
Phytophthora palmivora, 11
Phytophthora parasitica var. *nicotianae*
systemic acquired resistance and, 242
Pierce, N. B., 35
Pinchot, G., 38
Pine bark beetle, 154
Pine industry, 94–95
Pinewood nematode (PWN), 153–63
banning of, 154–56
distribution of, 156–57
hosts of, 157
mitigation of, 159–62
pathogenicity of, 157
taxonomy of, 156

transmission of, 158–59
vectors for, 157–58
Pinus
white pine blister rust and, 91
Pithomyces chartarum
source of, 10
Plant-bacterial interactions
hrp genes and, 129–46
Plant defense responses
induction of
hrp genes and, 142–43
Plant gene tagging vectors
Agrobacterium-based, 49–50
Plant growth promoting rhizobacteria (PGPR), 237
Plant pararetroviruses
mutation rates and, 194
recombination in, 196
Plant Quarantine Act, 40, 88, 96
Plant roots
Fusarium oxysporum and, 112
Plants
interactions with barley yellow dwarf virus, 170–72
Plant tranformation vectors
phytohormone action and, 52
Plant transformation strategies, 50–51
Plant transformation vectors
Agrobacterium-based, 47–49
Plant viruses
evolution of, 191–204
driving forces in, 192–99
practical implications of, 203–4
fitness and, 198–99
gene duplication in, 197
mutation rates and, 193–95
natural selection and, 198–99
origins of, 200–3
overprinting in, 197–98
reassortment in, 196–97
recombination in, 195–96
used to present foreign peptide sequences
genome organization of, 69
Plant virus peptide expression, 67–84
examples of, 68–76
structure-based, 76–82
Plasmaopara viticola
control of, 350
Plasmopara viticola, 20
fungicides for, 353
Polysaccharides
plant infection processes and, 139
Potato
proteinase inhibitors in induction of, 252
systemic acquired resistance in, 239, 242
salicylic acid and, 248
Potato blight, 376
fungicides for, 354
Potato late blight, 31
disease gradients for, 7
infection gradients for, 6
Potato leafroll virus (PLRV), 168
mutation rates and, 194
Potato viruses, 7–8
Potato virus X (PVX)
capsid peptide presentation and, 71
Potexviruses, 71
Powdery mildew
access to plant tissues and, 212–13
fungicides for, 353, 355
Powdery mildew resistance gene, 307–8
Powell, K. A., 349–66
Pratylenchus scribneri, 24
Probenazole, 356
Propenazole
systemic acquired resistance and, 257
Protein kinase C
germination/differentiation in fungi and, 221
Pryor, T., 271–89
Pseudocercosporella herpotrichoides
fungicides for, 355
Pseudomonas
plasmid pVS1 of, 48
Pseudomonas savastanoi
phytohormone biosynthesis and, 52
Pseudomonas syringae
hrp systems of, 132, 136
populations on leaves, 332–34, 336
systemic acquired resistance and, 236, 243
tox genes of, 143
Pseudomonas syringae hrpM
β-(1,2)-glucan synthesis and, 139–40
Pseudomonas syringae pv. *lachrymans*
systemic acquired resistance and, 142
Pseudomonas syringae pv. *phaseolicola*
hrp mutants of, 129–30
Pseudomonas syringae pv. *syringae*
harpins produced by, 138
hrp mutants of, 129–30
systemic acquired resistance in cucumber and, 142
Puccinia graminis, 31
black stem rust of wheat and, 4
Puccinia graminis secalis
avirulence on wheat cultivars, 316
Puccinia graminis tritici
avirulence on wheat cultivars, 316
germ tubes of
environmental signaling and, 216
Puccinia polysora
adult-plant resistance to, 307
appressorium induction and, 217
inoculation with
rapid necrotic reaction and, 302
Puccinia recondita
wheat leaf rust and, 302
Puccinia sorghi
appressorium induction and, 217
inoculation with
rapid necrotic reaction and, 302–3
resistance to, 299–300
non-race-specific, 307
Puccinia striiformis tritici
virulence on barley grass, 319
Purple mold
white pine blister rust and, 104–5
Putrescine
production of, 58
pVS1 plasmid, 48
Pyricularia oryzae
fungicides for, 351
Pyrimethanil, 354
structure of, 354
Pyrrolnitrin, 351
structure of, 352

Q

Quinoxyfen, 355
structure of, 355

R

Radish
systemic acquired resistance in, 239
Rainfall
microbial populations on leaves and, 336–37
Ralstonia solanacearum
eps genes of, 143

hrp genes of, 130
regulation of, 137
hrp systems of, 132
Ramularia vallisumbrosae, 4–5
Rasochova, L., 167–85
rDNA methodology
diagnosis of pathogen infection and, 365
Reassortment
plant virus evolution and, 196–97
Recombination
plant virus evolution and, 195–96
in *rp1 complex*, 296–305
Red clover
systemic acquired resistance in, 239
Red clover necrotic mosaic virus (RCNMV), 169
Reiss, B., 45–61
Reoviruses
replication of, 202
Resistance breeding
anticipatory, 311–24
strategy of, 321–23
Restriction fragment length polymorphism (RFLP)
rp1 complex and, 296
Rhabdoviruses
replication of, 202
Rhizoctonia solani
appressorium and, 212
fungicides for, 351
systemic acquired resistance and, 242
Ribes
white pine blister rust and, 91, 97–103
Ribosomal frameshifting
luteoviruses and, 176–77
Rice
systemic acquired resistance in, 239
salicylic acid and, 248
Rice blast
fungicides for, 351, 356
Ri plasmids, 48
RK2 plasmids, 48
RK2 replicon, 48
RNA editing
plant viruses and, 193–94
RNA phage N6
fitness in, 198
RNA viruses
mutation rates for, 194
as quasispecies, 199–200
recombination in, 195–96
Roossinck, M. J., 191–204
Root growth
jasmonates and, 251
rp1 complex
genetic recombination in, 296–305
rust resistance in maize and, 293–309
Rp genes
rust resistance and, 294
Rp1 genes
durable resistance from, 305–8
with lesion mimic phenotypes creation of, 302–5
non-race-specific resistance from, 306–8
with novel specificities generation of, 299–302
Rust resistance
effects on pathogen populations, 315–19
in maize, 293–309
genetic control of, 294–96
in wheat
anticipatory breeding for, 311–24
See also Flax rust resistance genes
Rust resistance genes
with lesion mimic phenotypes creation of, 302–5
in *rp1* area, 294–96
Rusts
access to plant tissues and, 212–13
See also specific type

S

Saccharopolyspora rectivirgula
farmer's lung and, 10
Salicylic acid
biosynthesis and metabolism of, 247–48
mode of action of, 248–50
systemic acquired resistance and, 245–51, 356
Salmonella typhimurium
type III secretion system in, 133
Satellite RNA
of bamboo mosaic potexvirus, 201
of barley yellow dwarf virus, 182–83
Saunders, W., 37–38
Schell, J., 45–61
Schizophillum commune
hydrophobins of, 215
Schmidt, W., 5
Schulz, M. A., 349–66
Sclerotinia
fungicides for, 352
Sclerotinia fuckeliana, 5
Sclerotinia polybastis, 5
Seedborne smuts, 376
Septoria nodorum
fungicides for, 354
Serpula lacrymans
basidiospores of, 8
Sheath blight
fungicides for, 351
Shigella flexneri
type III secretion system in, 133
Sicklepod
systemic acquired resistance in, 239
Signal transduction
rust resistance and, 286
Sin Nombre hantavirus, 204
Sirex noctilio, 154
Smith, E. F., 22, 22, 32, 35, 39
Smith-Lever Agricultural Extension Act, 40
Sodium chlorate
eradication of *Ribes* and, 101
Sodium N-methyldithiocarbamate
pinewood nematode extermination and, 160
Soils
Fusarium oxysporum in, 112
Soraphen A, 351
structure of, 351
Southern rust pathogen, 302
Southworth, E. A., 22, 32, 35
Soybean
systemic acquired resistance in, 239
Soybean dwarf luteovirus, 168
Soybean saur promoter, 56
Spinks, C. A., 349–66
Spiroxamine, 355–56
structure of, 356
Spore dispersal, 9
Sporobolomyces
ballistospores of, 8
Sporobolomyces roseus
colonization of leaves by, 338
SSF 126, 352
structure of, 353
Stedman, O. J., 8
Steiner, G., 24
Stem rust, 315–16
Sterol biosynthesis fungicides, 359
Stevenson, J. A., 38
Sticher, L., 235–59
Stomatal opening
jasmonates and, 251
Stripe rust, 318–19
Strobilurin A, 352
structure of, 353
Strobilurins, 352–53
Strobilurus tenacellus
fungicidal natural products in, 352

Stylosanthes guianensis
systemic acquired resistance in, 239, 242
Sugar beet leaves
Pseudomonas syringae on, 334
Sutton, O. G., 5–6
Swingle, W. T., 35
Synthetic compounds
systemic acquired resistance and, 257–59
Systemic acquired resistance (SAR), 235–59
chemical activators of, 256–59
conditioning and, 243–45
electrical signals and, 254–55
ethylene and, 255–56
induction in cucumber, 142
inorganic compounds and, 256
jasmonates and, 251–52
lignification and, 237–41
mechanisms involved in, 237–45
natural organic compounds and, 256–57
pathogenesis-related proteins and, 241–43
plants exhibiting, 238–39
salicylic acid and, 245–51, 356
signals for, 245–56
synthetic compounds and, 257–59
systemin and, 252–54
Systemin
systemic acquired resistance and, 252–54

T

T-DNA
transfer to plant cells, 46–47
Temperature
appressorium formation and, 216
pinewood nematode and, 160–61
Tendril coiling
jasmonates and, 251
Tenuazonic acid
food crops affected by, 350
Tenuiviruses
mutation rates and, 194
replication of, 202
tet repressor system, 57–58
Thermoactinomyces vulgaris
farmer's lung and, 10
Thermopolyspora polyspora
farmer's lung and, 10
Thigmotropism, 216
Ti plasmid, 47
Tobacco
nuclear genome of
geminivirus DNA sequences in, 202
pathogenesis-related proteins and, 241
systemic acquired resistance in, 239, 242
induction of, 256
salicylic acid and, 248
transformation and, 50
Tobacco mosaic virus (TMV)
capsid peptide presentation and, 68–71
mutation rates and, 194
Tobacco necrosis virus
systemic acquired resistance and, 142
Tobacco rattle tobravirus
reassortment and, 197
Tobacco ringspot virus (TRSV), 182
Tobamoviruses
mutation rates and, 194
Tomato
proteinase inhibitors in
induction of, 252
systemic acquired resistance in, 239, 242
Tomato blight, 376
Tomato bushy stunt virus (TBSV)
capsid peptide presentation and, 72
Tomato-*Phytophtora infestans*
defense response and, 244
Tombusviruses, 72
Tospoviruses
replication of, 202
Tracy, S. M., 30, 31
Transgenes
expression of
controlling, 55
heat induction of, 55–56
tissue-specific, 56
Transgenic flax
cloned rust resistance genes and, 279
Transgenic resistance
barlye yellow dwarf virus and, 184
Trelease, W., 30
Tuberculina maxima
white pine blister rust and, 104–5
Tuber formation
jasmonates and, 251
Turgor pressure
appressorium function and, 225–26
Tylenchus devastatrix, 24
Tymoviruses
overlapping in, 198
Type III secretion systems
hrp gene products and, 133–34

U

United States Department of Agriculture (USDA), 19–22, 30, 32, 36–41
Bureau of Entomology and Plant Quarantine, 96
Bureau of Plant Industry, 96
integrated pest management strategic plan of, 381–85
Uromyces
appressorium formation in, 212
calcium signaling and, 221
Uromyces appendiculatus
appressorium formation in
cyclic nucleotides and, 221–22
germ tubes of
environmental signaling and, 216–17
Uromyces viciae fabae
appressorium formation in
cellulase secretion and, 227
attachment to host surface, 214

V

Validamycin A, 351
Van Der Plank, J. E., 13
Vasey, G., 19
Vegetative compatibility (VC)
inter-isolate relationships and, 118, 121
Venturia inaequalis
appressorium and, 212
Viala, P., 21
Vitronectin
appressorium formation and, 219

W

Waite, M. B., 35
Walden, R., 45–61
Watermelon
systemic acquired resistance in, 239
Webber, H. J., 35
Western flower thrip
host range of, 204
Wheat
black stem rust of
cause of, 4
leaves of
microbial populations on, 336

resistance to barley yellow dwarf virus in, 183
rust resistance in anticipatory breeding for, 311–24
Wheat leaf rust, 302
Wheat rust pathogens
variability in Australia, 320–21
Wheat stem rust
survival on *Agropyron scabrum*, 319
Whinfield, B., 7
White pine blister rust, 40, 87–105
antibiotic project and, 103–4
arrival in North America, 95–96
disease cycle of, 91–94
eradication of *Ribes* and, 97–103
hosts of, 91
publications concerning, 88–91
purple mold and, 104–5
Whitney, M., 38
Wiley, H. W., 38
Williams, D. A., 8
Wilson, J., 37, 38, 40
WISDOM, 379, 387–88
WL 28325
systemic acquired resistance and, 257
Woodchips
pinewood nematode and, 160–61
Woods, A. F., 35, 36, 38
Worthington, P. A., 349–66

X

Xanthomonas campestris
hrp genes of, 130
hrp systems of, 132
Xanthomonas campestris pv. *campestris*
populations on *Brassica campestris* leaves, 336
Xanthomonas campestris pv. *undulosa*
populations on wheat leaves, 336
Xanthomonas campestris pv. *vesicatoria*
hrp genes of
regulation of, 136
Xanthomonas oryzae pv. *oryzae*
hrp genes of, 130
Xanthomonas phaseoli
populations on bean leaves, 336
Xanthomonas phaseoli fuscans
populations on bean leaves, 336

Y

Yeasts
populations on leaves, 330
rainfall and, 336–37
Yersinia enterocolitica
type III secretion system in, 133
Yersinia pestis
type III secretion system in, 133
Youle, D., 349–66

Z

Zoophthora radicans
appressorium formation in
calcium signaling and, 221